Quarterly Report – Public Page

Date of Report: 6th Quarter Report – March 31, 2020
Contract Number: 693JK31810016
Prepared for: Department of Transportation/Pipeline and Hazardous Materials Safety Administration
Project Title: Reliability of Subsurface Safety Valves
Prepared by: Battelle Memorial Institute
Contact Information: Kathryn Johnson (614) 424-7302 johnsonk@battelle.org
For quarterly period ending: March 31, 2020

1: Items Completed During this Quarterly Period:

Item #	*Task #*	*Activity/Deliverable*	*Title*	*Federal Cost*	*Cost Share*
9	***2***	***Sponsor Industry Workshop***	***Sponsor Industry workshop to communicate and socialize findings of the raw data***	***$51,312***	***N/A***
13	***4***	***6th Quarterly Status Report***	***Submit 6th quarterly report***	***$13,500***	***N/A***

2: Items Not-Completed During this Quarterly Period:

Item #	*Task #*	*Activity/Deliverable*	*Title*	*Federal Cost*	*Cost Share*
10	***3***	***Develop Recommendations and Improvements to Current Designs and Standards***	***Report on recommendations for product line revisions and propose candidate installations design for UGS applications***	***$51,312***	***N/A***
12	***3***	***Develop Recommendations and Improvements to Current Designs and Standards***	***Report on recommendations for product line revisions and propose candidate installations design for UGS applications***	***$69,340***	***N/A***

See Table 1 – Task Schedule and Milestone Payments. Contractually agreed milestone payments do not necessarily align with completion of tasks. Invoices will reflect Payable Milestone amounts in Table 1.

3: Project Financial Tracking During this Quarterly Period:

Quarterly payable milestones/invoices are summarized in Figure 1.

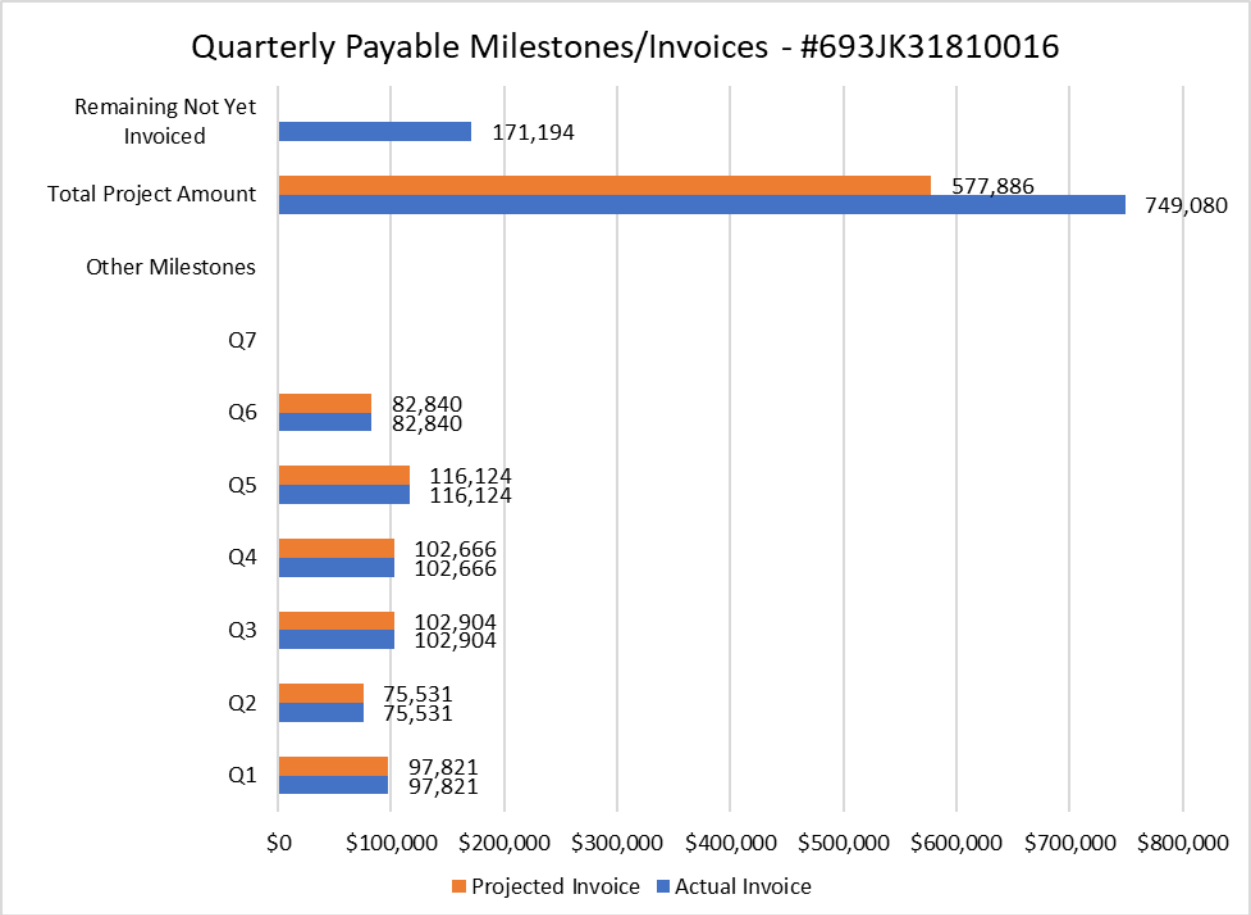

Figure 1. Quarterly Payable Milestones and Invoices.

4: Project Technical Status

Project team activities during the sixth quarter include:

1. Identified detailed failure rates model to evaluate the SSSV applicability. The model is based on the API 581 recommended practice methodology.

2. Modified a model created by the 2017 Joint Industry Task Force (JITF), to account for SSSV-related workover safety risks as well as for benefits of SSSV installation.

3. Developed the SSSV-related components of the failure model.

4. Used the failure model to analyze applicability of SSSVs for combinations of several common UGS well design styles, various reservoir pressures and volumes, and different geographic locations with different population density.

5. Finalized plans for the SSSV Industry Workshop in Denver, CO, March 4-5, 2020.

6. Began Task 3 efforts, using information from Tasks 1 and 2 to develop recommendations and improvements to current designs and standards.

7. Prepared and submitted the Quarterly Status Report.

The project deliverables completed during the sixth quarter include:

1. Sponsored industry workshop

2. Quarterly status and progress report

3. Facilitated the mid-term team meeting

During the sixth quarter of this project, work focused on planning and facilitating the SSSV Industry Workshop in Denver, CO, which occurred on March 4-5, 2020. The goal of this event was to present the team's preliminary risk reduction projection, introduce the risk model, and to obtain feedback from UGS industry. The workshop was attended by over 40 representatives from gas storage operators, oil and gas operators, service companies, and PHMSA. The event allowed the Battelle-Sandia team to introduce the SSSV failure rates model, which is based on API 581 Risk-Based Inspection Technology recommended practice methodology and provides estimates of likelihood of failures and estimates of the consequences of failure. The consequences of failure are important in decisions to manage risk by implementing isolation devices such as SSSV. Additionally, a model created by the 2017 Joint Industry Task Force (JITF), was further modified to account for SSSV-related workover safety risks as well as for benefits of SSSV installation. The model can be used to evaluate risks for several installations with and without SSSVs for wells with different construction styles, different reservoir volumes and pressures, and for locations with various population densities. The workshop discussion focused around four main topics:

- Barriers to collecting and sharing UGS-specific reliability and failure data
- The risk model developed by Battelle/Sandia
- Applicability of SSSVs in UGS wells
- Applicability of T&P in UGS wells

During the day and a half workshop, half of the time was dedicated to presentations, with the other half to open discussion. The majority of the presentations were prepared by the Battelle-Sandia team. One UGS operator, California-based PG&E, presented their perspective and experience on safety valves in UGS

wells. During the workshop, the Battelle-Sandia team was able to obtain feedback from the underground gas storage community on the findings and resulting evaluations of risk-based management and the use of SSSV in underground gas storage. The feedback obtained from the workshop will lead to a set of recommendations and guidelines that are practical and will ultimately improve data management and understanding of systems reliabilities.

A full list of discussion points is given in the workshop presentations available at PHMSA's PRIMIS site https://primis.phmsa.dot.gov/matrix/PrjHome.rdm?prj=743.

5: Project Schedule

A schedule in graphic form is presented in Appendix 1 of this document. The project is on schedule. Task completion and milestone status described in the Technical Status section is summarized in Table 1. All tasks are on schedule and completed tasks were completed within the schedule timeline.

Table 1 – Task Schedule and Milestone Payments

Technical and Deliverable Milestone Schedule								
			Quarter No.	Expected Completion Date/Mos		Percent Complete	Federal Payment	
Item No.	Task No.	Activity/Deliverable			Payable Milestone			*Total
	(per proposal)	ACTIVITY/DELIVERABLE			TITLE			
1	1	Compile and Review Literature and Data on Incidents for UGS and Production	1	6 months	Report on the literature review, interviews with subject matter experts, and state occurance report reviews	100%		84,321
2	4	1st Quarterly Status Report	1	3 months	Submit 1st Quarterly Report	100%		13,500
		First Payable Milestone	**1**	**3 months**	**SUBTOTAL**		**97,821**	**97,821**
3	1	Task 1Report	2	6 months	Submit Final Task 1Report (Report on literature review, interviews with subject matter experts, and state occurance report review)	100%		62,031
4	4	2nd Quarterly Status Report	2	6 months	Submit 2nd Quarterly Report	100%		13,500
		Second Payable Milestone	**2**	**6 months**	**SUBTOTAL**		**75,531**	**75,531**
5	2	Develop Evaluation Criteria	3	15 months	Report on failure evaluation criteria	100%		89,404
6	4	3rd Quarterly Status Report	3	9 months	Submit 3rd Quarterly Report	100%		13,500
		Third Payable Milestone	**3**	**9 months**	**SUBTOTAL**		**102,904**	**102,904**
7	2	Task 2 Report	4	15 months	Submit Final Task 2 Report (Report on failure evaluation criteria)	100%		89,166
8	4	4th Quarterly Status Report	4	12 months	Submit 4th quarterly report	100%		13,500
		Fourth Payable Milestone	**4**	**12 months**	**SUBTOTAL**		**102,666**	**102,666**
9	2	Sponsor Industry Workshop	5	18 months	Sponsor Industry workshop to communicate and socialize findings of the data review	100%		51,312
10	3	Develop Recommendations and Improvements to Current Designs and Standards	5	24 Months	Report on reccomendations for product line revisions and propose candidate installation design for UGS applications	5%		51,312
11	4	5th Quarterly Status Report	5	15 months	Submit 5th Quarterly Report	100%		13,500
		Fifth Payable Milestone	**5**	**15 months**	**SUBTOTAL**		**116,124**	**116,124**
12	3	Develop Recommendations and Improvements to Current Designs and Standards	6	24 Months	Report on reccomendations for product line revisions and propose candidate installation design for UGS applications	5%		69,340
13	4	6th Quarterly Status Report	6	18 months	Submit 6th Quarterly Report	100%		13,500
		Sixth Payable Milestone	**6**	**18 months**	**SUBTOTAL**		**82,840**	**82,840**
14	3	Develop Recommendations and Improvements to Current Designs and Standards	7	24 Months	Report on reccomendations for product line revisions and propose candidate installation design for UGS applications			69,204
15	4	7th Quarterly Status Report	7	21months	Submit 7th quarterly report			13,500
		Seventh Payable Milestone	**7**	**21 months**	**SUBTOTAL**		**82,704**	**82,704**
16	3	Task 3 Final Report	8	24 Months	Submit Final Task 3 report on reccomendations for product line revisions and propose candidate installation design for UGS applications			40,000
17***	4	Prepare and Submit Draft Final	8	24 Months	Submit draft final report			48,489
		Eighth Payable Milestone	**8**	**24 months**	**SUBTOTAL**		**88,489**	**88,489**
18	N/A	Prepare & Present Paper at public event or publish paper in journal/magazine	N/A	N/A	Prepare & Present Paper at public event or publish paper in journal/magazine			
19	N/A	Final Virtually Held Info Dissemination Meeting	N/A	N/A	Final Virtually Held Info Dissemination Meeting			
20**	N/A	Peer Review #1- Virtually Administered	N/A	N/A	Prepare presentation and present. Submit presentation file.			
21**	N/A	Peer Review #2 - Virtually Administered	N/A	N/A	Prepare presentation and present. Submit presentation file.			
22****	4	Address Comments and Submit Final Report	N/A	N/A	Submit final report			
23*****	4	Public Version of Final Report	N/A	N/A	Submit public version of final report			
					GRAND TOTALS		**749,080**	**749,080**

Appendix 1 – Project Timeline

	Task	Q1			Q2			Q3			Q4			Q5			Q6			Q7			Q8		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	**Task 1 - Literature Review**																								
1.1	Kick-Off Meeting	◆																							
1.2	Open Lit and Case Study Review					◆																			
1.3	Interview SMEs					◆																			
1.4	Review Individual State Occurences					◆																			
1.5	Task 1 Final Report						◆																		
2	**Task 2 - Develop Evaluation Criteria**																								
2.1	Evaluate Failure Criteria								◆																
2.2	Review API Standards										◆														
2.3	Task 2 Final Report															◆									
2.4	Sponsor Industry Workshop																		◆						
3	**Task 3 - Develop Recommendations and Improvements**																								
3.1	Review Success/Failure Info																◆								
3.2	Review Existing Product-Line Offerings																				◆				
3.3	Develop Recommendations for Product Line Revisions																								◆
4	**Task 4 - PM and Reporting**																								
4.1	DOT Project Review Meeting			◆												◆									
4.2	Mid-Term Team Meeting													◆											
4.3	Final Team Meeting																								◆
4.4	Quarterly and Final Project Reports			◆			◆			◆			◆			◆			◆			◆			◆
4.5	Publish Papers and Present																								◆
		◆ = Objective Deadline															= Period of Performance								